CERTIFICATE OF FACSIMILE TRANSMISSION

I hereby certify that this correspondence is being transmitted by facsimile to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 at 703-872-9306, on January 12, 2004.

DENISE A. WELCH

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PATENT APPLICATION
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN THE APPLICATION OF
GROT

DOCKET NO.: GROT-2II

SERIAL NO.: 10/020,837

EXAMINER: B. F. BELL

FILED: DECEMBER 13, 2001

ART UNIT: 1745

TITLE: COATED FUEL CELL ELECTRODES

WILMINGTON, DE
DATE: JANUARY 12, 2004

DECLARATION UNDER 37 C.F.R. 1.132

I, Stephen A. Grot, hereby declare THAT:

I am a citizen of the United States of America residing in Middletown, Delaware;

I attended the University of Delaware, and was awarded the degree of Bachelor of Science in Electrical Engineering from that institution in 1986. I attended Penn State University, and was awarded the degree of Doctor of Philosophy in Electrical Engineering from that institution in 1992.

From 1993 to 1995 I was a Post Doctoral Research Associate at the Los Alamos National Laboratory. In the course of my tenure there, I developed procedures for testing and fabrication of PEM fuel cell stack components, and primarily membrane electrode assemblies. In addition, I designed, built and operated single cell test stands that could perform computer controlled tests, and assisted in the transfer of the technology to General Motors;

From 1996 to 1998 I was employed by General Motors Coporation as Senior Project Engineer in their Fuel Cell Program in Rochester, NY. There, I was responsible for the testing and development of fuel cell stack components;

In 1999 I founded Ion Power, Inc., a world-wide distributor of DuPont's NAFION® ionomer material. I am currently President of Ion Power, Inc.

I am an inventor of at least three inventions relating to fuel cells on which United States Patents have been granted, and an author of at least three technical publications relating to fuel cells;

I am the inventor of the invention described and claimed in the above-identified patent application. At the request of my attorney, I reviewed the United States Patents which formed the basis for the rejection of this application, including Uchida et al., U.S. Patent 5,474,857, Kato, U.S. Patent 6,054,230, and Okada et al., U.S. Patent 4,943,496. While each of these patents discloses coating an electrode with fluoropolymer, the fluorpolymers used do not meet the requirement of being a transport polymer which permits higher oxygen or hydrogen transport than water. These conclusions are based on values known from the literature and my own testing;

The basic units of permeability for membranes of this type are Barrers. Water itself has an oxygen permeability of 79 Barrers. The basic NAFION® ionomer has a permeability of 18 Barrers. Accordingly, the ionomer is about 4 times slower in oxygen transport than even water. Uchida discloses the inclusion of a fluoropolymer such as PTFE. However, crystalline PTFE has a permeability of 4.2 Barrers, even lower than NAFION® ionomer. Kato suggests adding a variety of fluoropolymers to enhance wter repellencey in the electrode structure. Of those listed, at Column 6, lines 21-33, crystalline PTFE has a permeability lower than water, as noted above. Similar performance characteristics result if tetrafluoroethylene/(perfluoroalkyl vinyl ether copolymer (PFA) or tetrafluoroethylene/hexafluoroproplylene copolymer (FEP) are used. By contrast, substantially amorphous PTFE exhibits higher oxygen or hydrogen transport than water;

By marked contrast to the fluoropolymers suggested in the cited references, the preferred perfluoroethers used as a transport polymer coating in the present application have significantly higher oxygen or hydrogen transport properties than water. These preferred perfluoroethers exhibit a permeability on the order of 500 to 1100 Barrers.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements are made with the knowedge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the

United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Stephen A. Grot